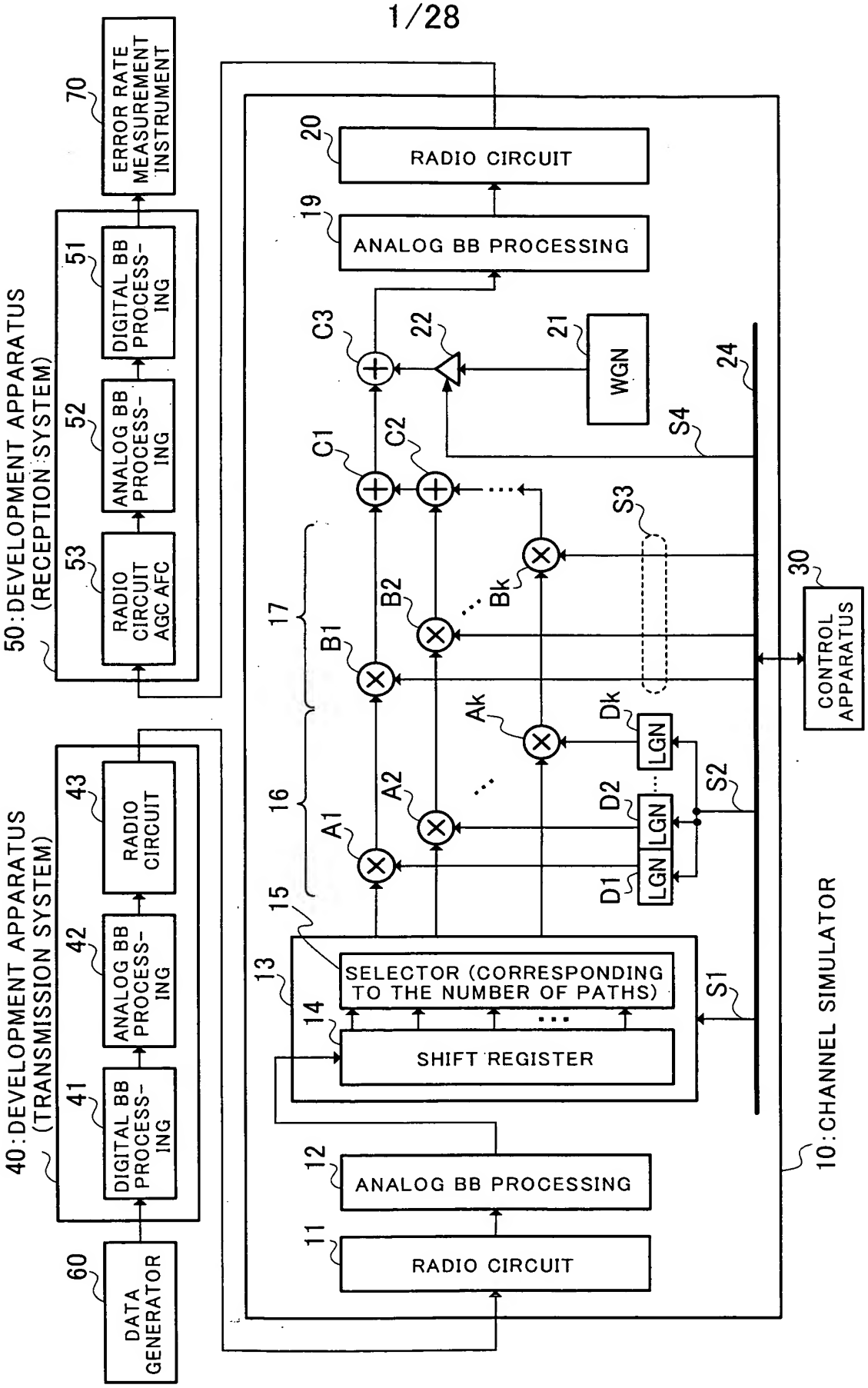


FIG.1 (PRIOR ART)

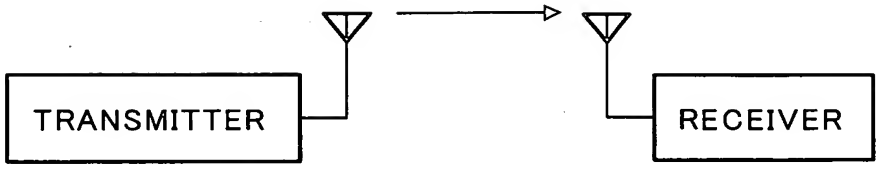


FIG.2

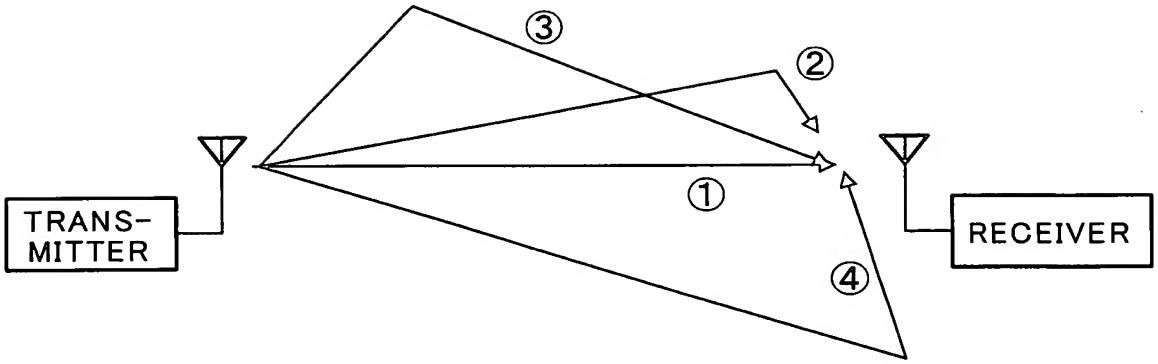


FIG.3

FIG.4(A)

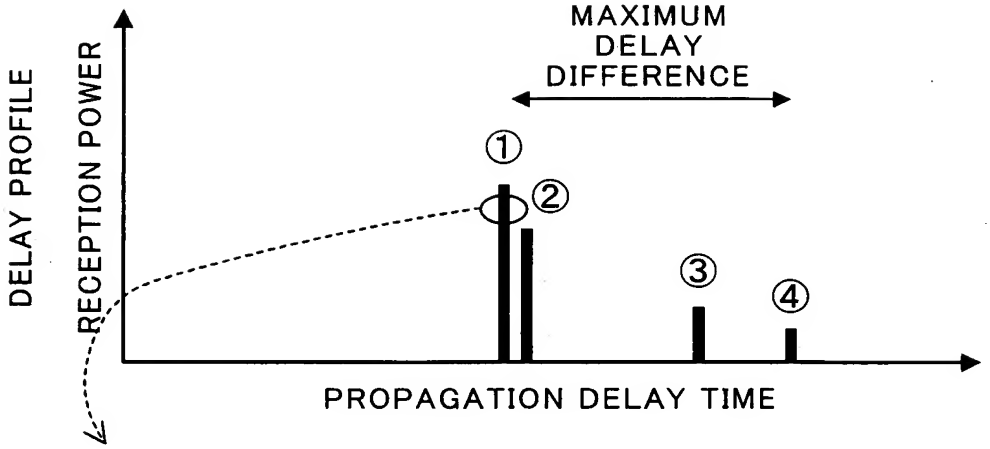


FIG.4(B)

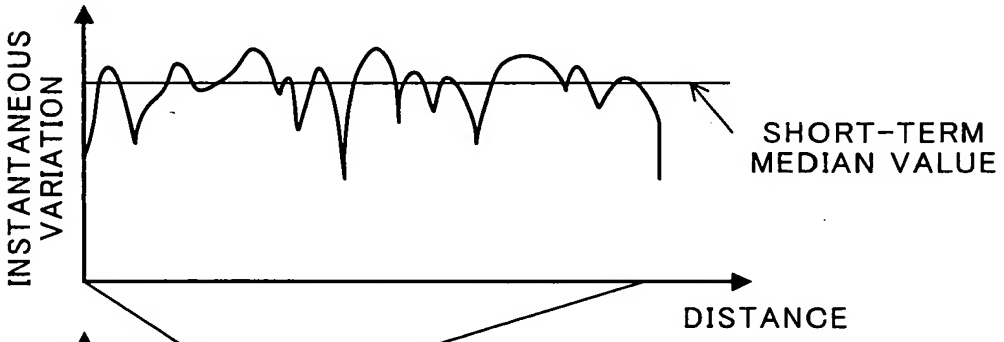


FIG.4(C)

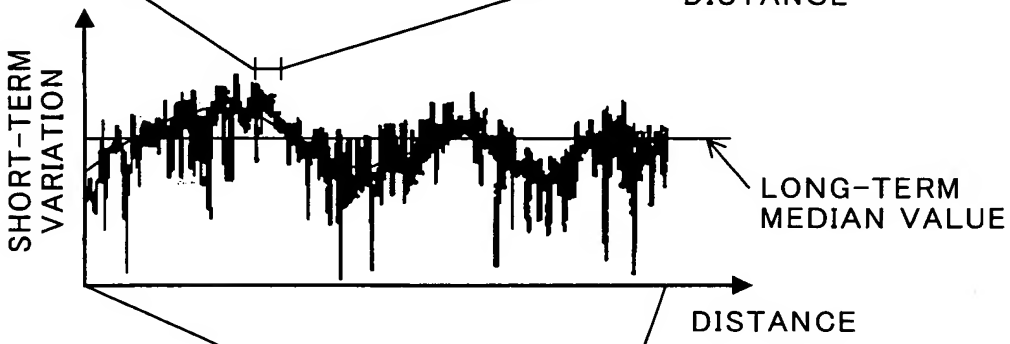
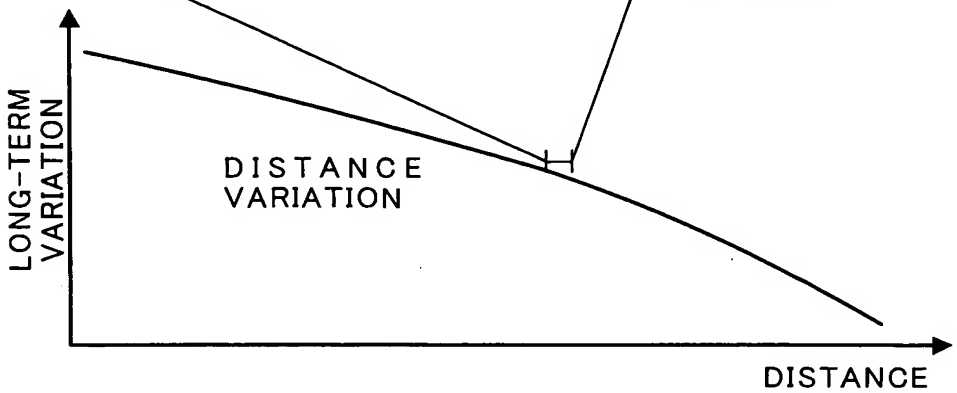


FIG.4(D)



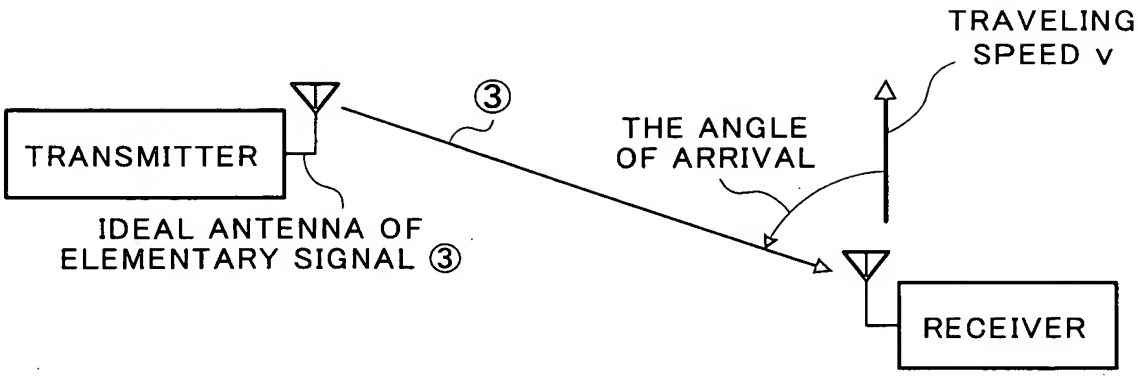

TRAVELING
SPEED v
③
TRANSMITTER
THE ANGLE
OF ARRIVAL
IDEAL ANTENNA OF
ELEMENTARY SIGNAL ③
RECEIVER

FIG.5

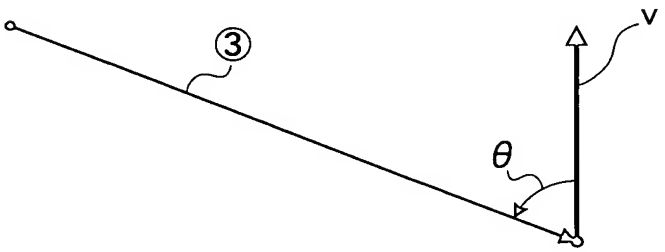

③
v
θ

FIG.6

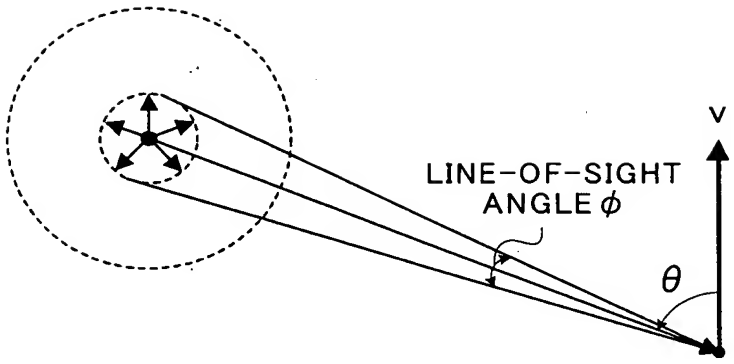

V
LINE-OF-SIGHT
ANGLE ϕ
θ

FIG.7

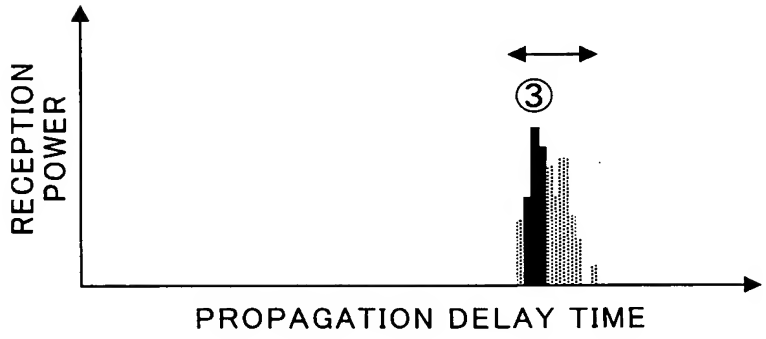

RECEPTION
POWER
③
PROPAGATION DELAY TIME

FIG.8

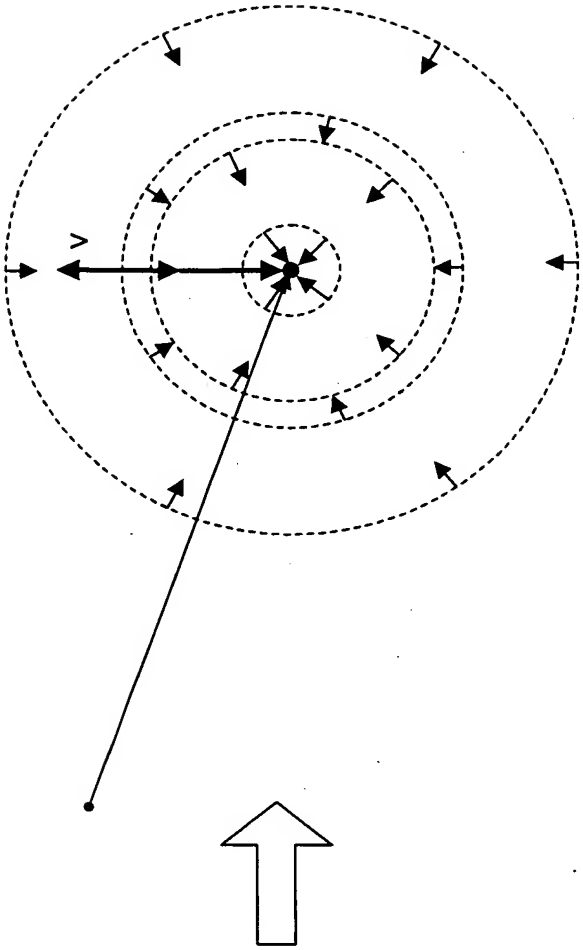


FIG.9(B)

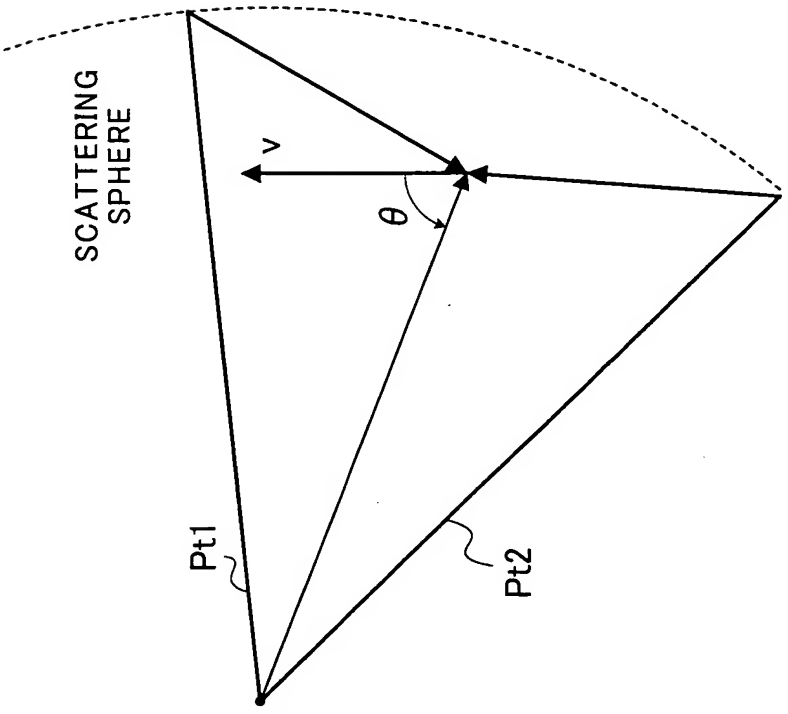


FIG.9(A)

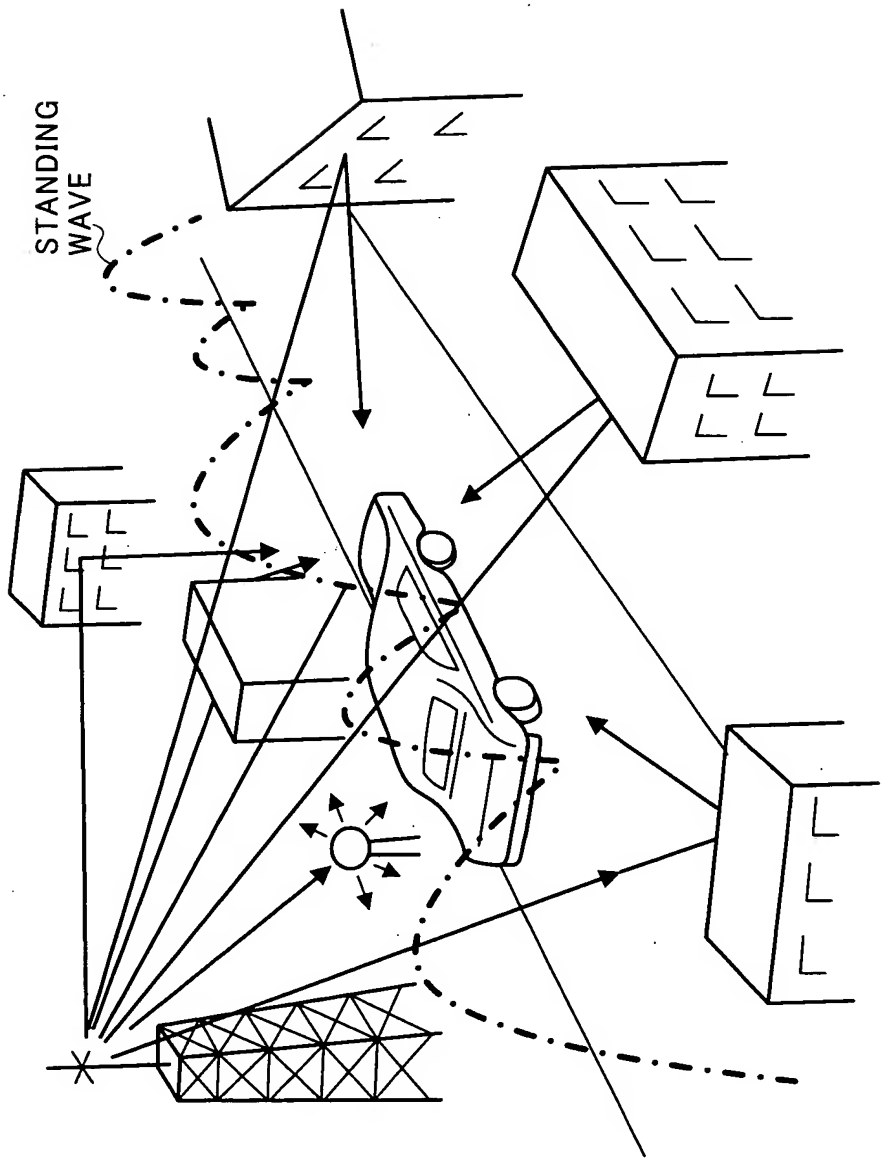


FIG.10

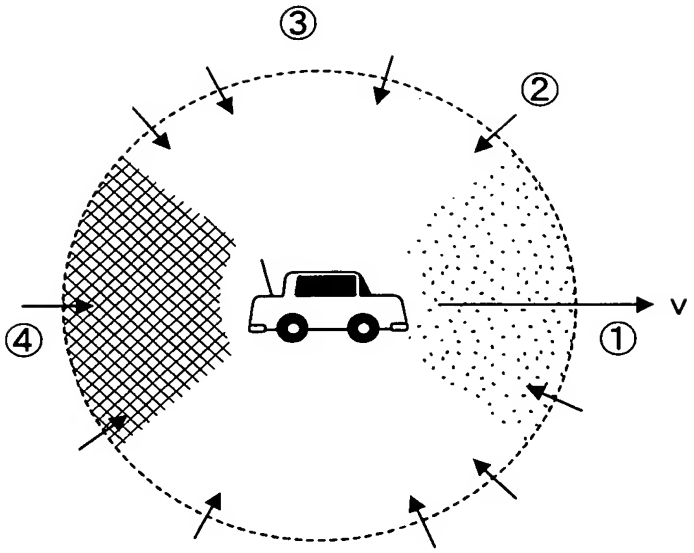


FIG.11

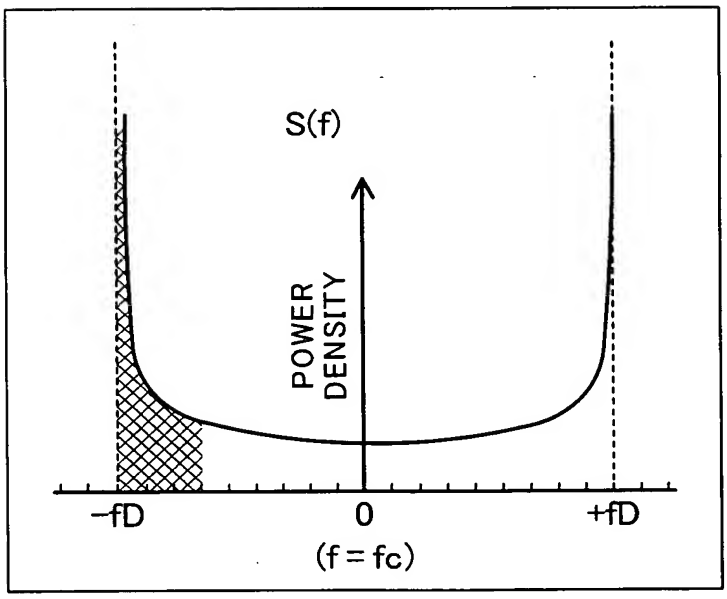


FIG.12

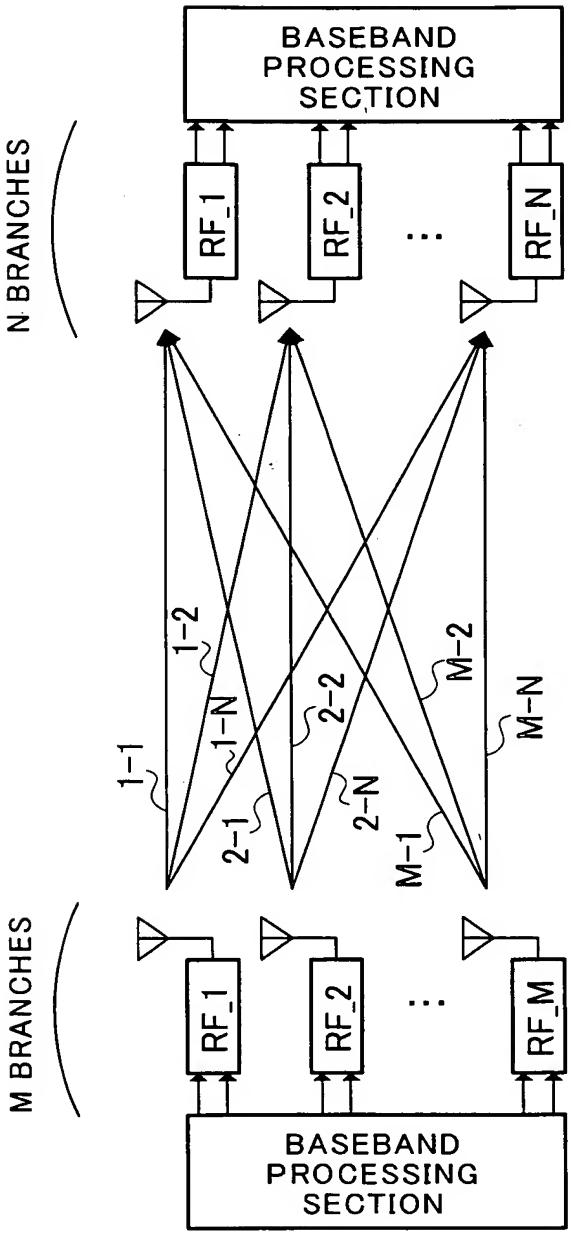

BASEBAND PROCESSING SECTION
N BRANCHES
RF_1
RF_2
RF_N
1-1
1-2
1-N
2-1
2-2
2-N
M-1
M-2
M-N
M BRANCHES
RF_1
RF_2
RF_M
BASEBAND PROCESSING SECTION

FIG.13

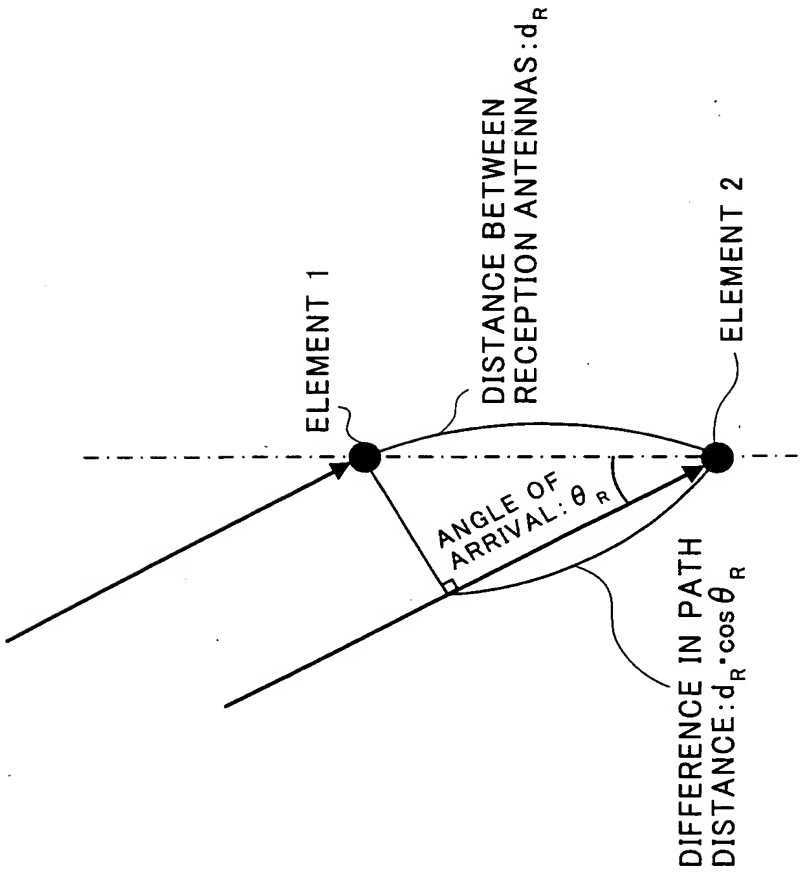


FIG.14(B)

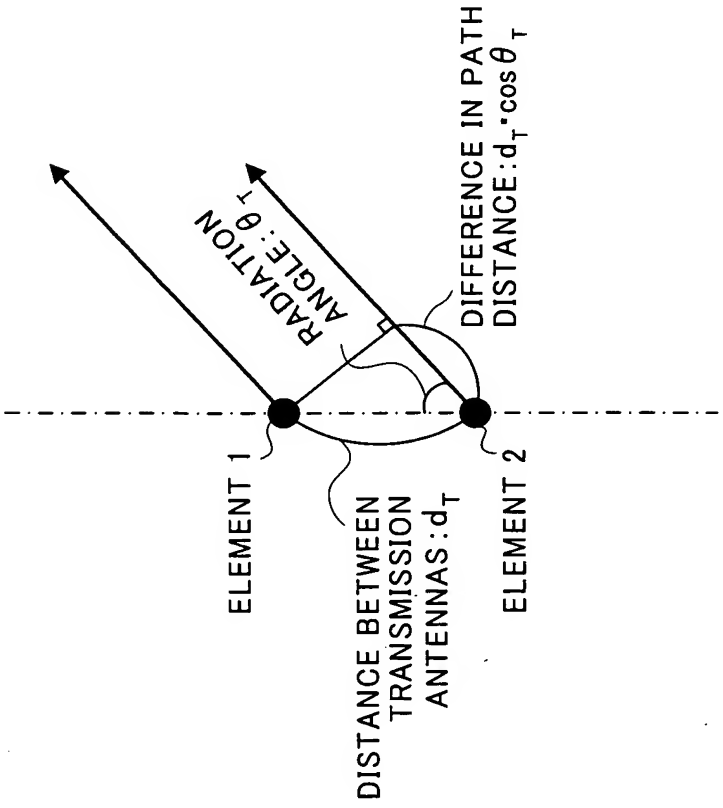


FIG.14(A)

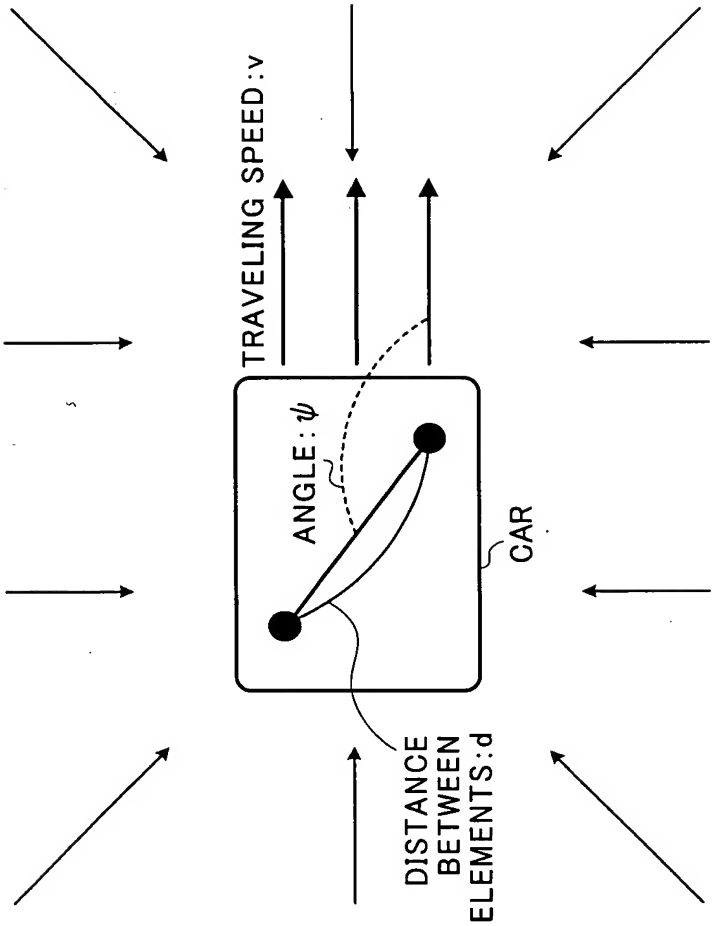


FIG.15

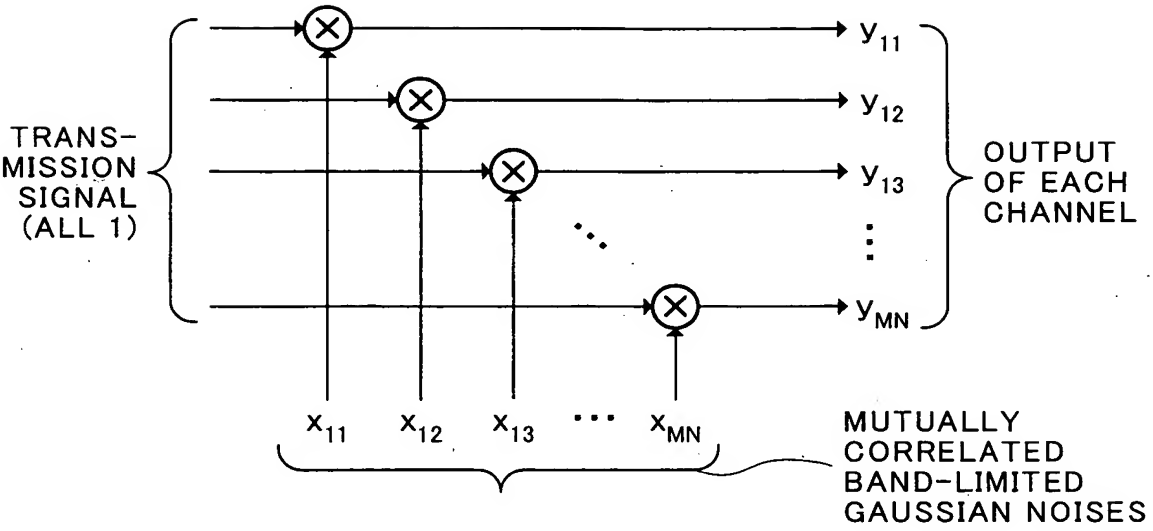

TRANS-
MISSION
SIGNAL
(ALL 1)
y_{11}
y_{12}
y_{13}
y_{MN}
OUTPUT
OF EACH
CHANNEL
x_{11}
x_{12}
x_{13}
x_{MN}
MUTUALLY
CORRELATED
BAND-LIMITED
GAUSSIAN NOISES

FIG.16

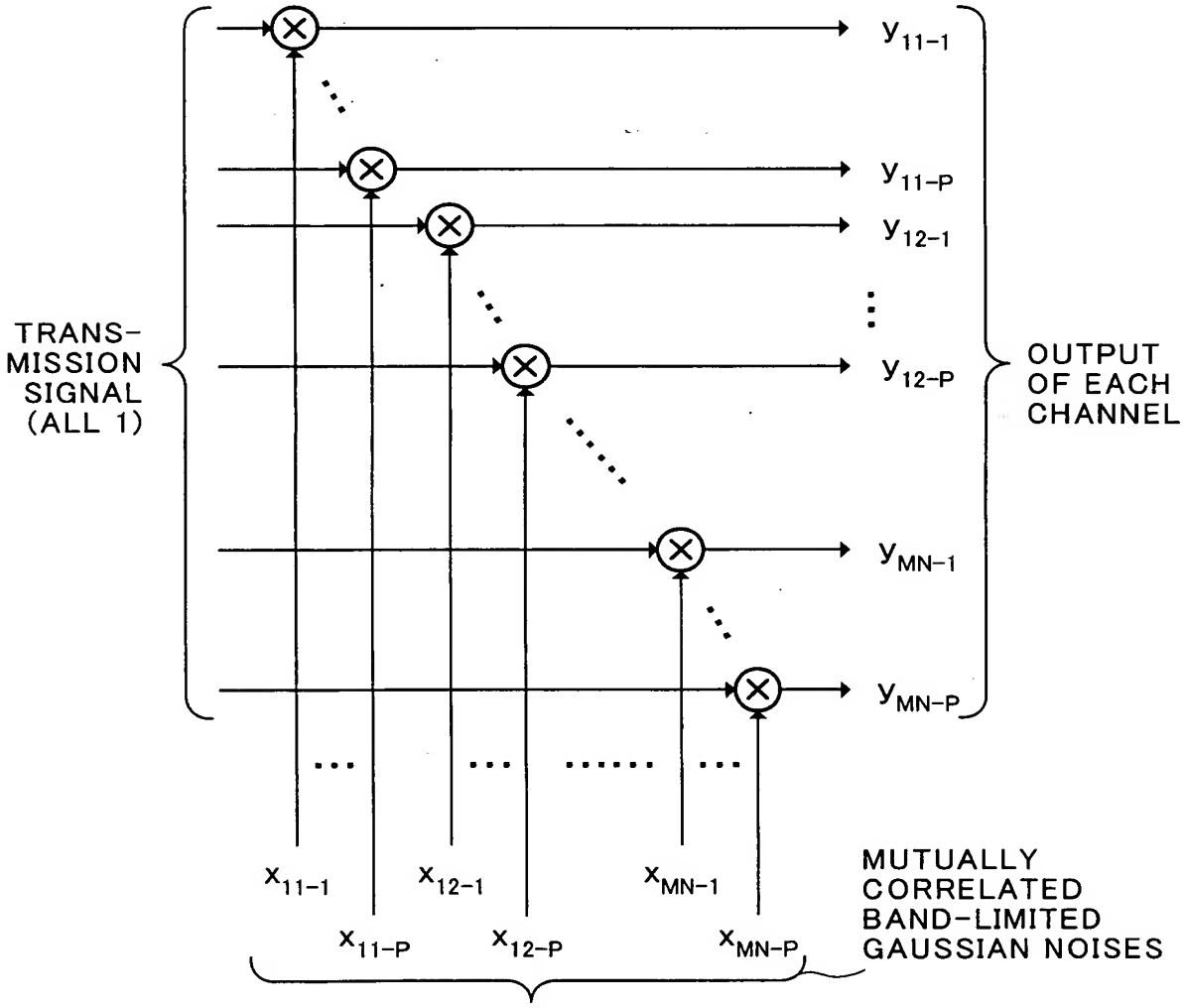

TRANS-
MISSION
SIGNAL
(ALL 1)
y_{11-1}
y_{11-P}
y_{12-1}
y_{12-P}
y_{MN-1}
y_{MN-P}
OUTPUT
OF EACH
CHANNEL
x_{11-1}
x_{11-P}
x_{12-1}
x_{12-P}
x_{MN-1}
x_{MN-P}
MUTUALLY
CORRELATED
BAND-LIMITED
GAUSSIAN NOISES

FIG.17

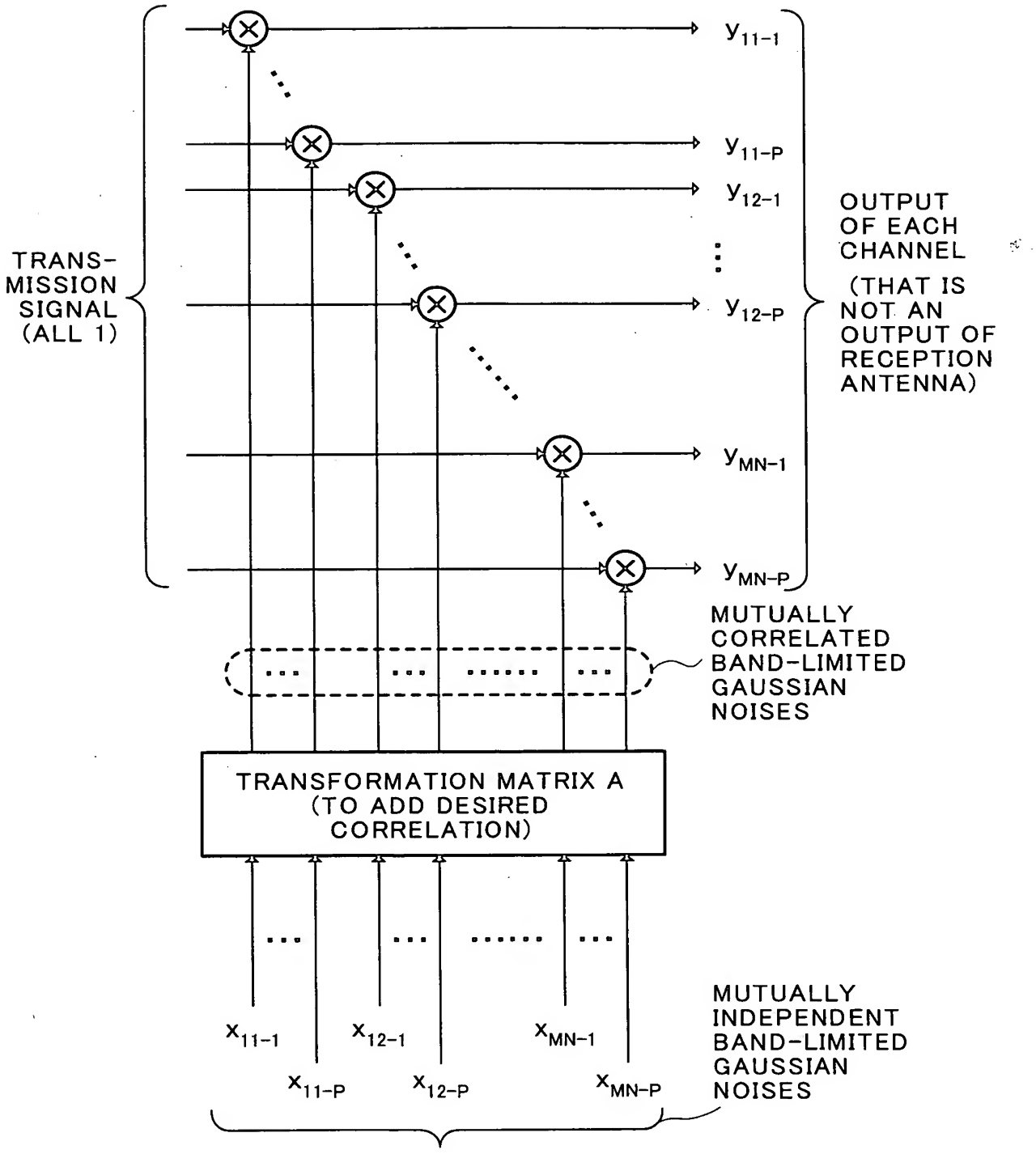

TRANS-
MISSION
SIGNAL
(ALL 1)
y_{11-1}
y_{11-P}
y_{12-1}
y_{12-P}
y_{MN-1}
y_{MN-P}
OUTPUT
OF EACH
CHANNEL
(THAT IS
NOT AN
OUTPUT OF
RECEPTION
ANTENNA)
MUTUALLY
CORRELATED
BAND-LIMITED
GAUSSIAN
NOISES
TRANSFORMATION MATRIX A
(TO ADD DESIRED
CORRELATION)
x_{11-1}
x_{11-P}
x_{12-1}
x_{12-P}
x_{MN-1}
x_{MN-P}
MUTUALLY
INDEPENDENT
BAND-LIMITED
GAUSSIAN
NOISES

FIG.18

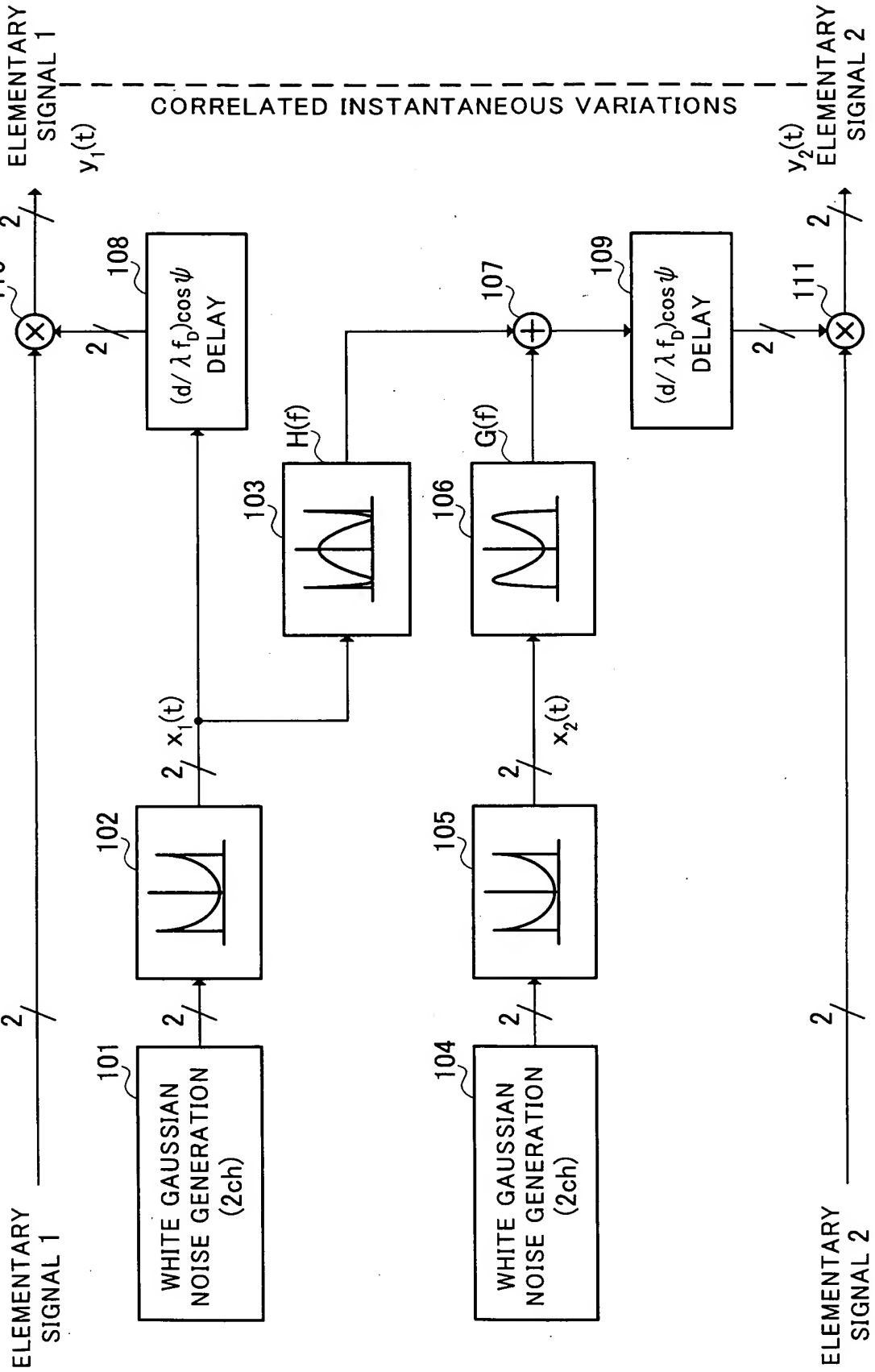

ELEMENTARY SIGNAL 1
CORRELATED INSTANTANEOUS VARIATIONS
ELEMENTARY SIGNAL 2
$y_1(t)$
$y_2(t)$
110
108
$(d/\lambda f_D)\cos\psi$ DELAY
107
109
$(d/\lambda f_D)\cos\psi$ DELAY
111
H(f)
G(f)
103
106
$x_1(t)$
$x_2(t)$
102
105
101
104
WHITE GAUSSIAN NOISE GENERATION (2ch)
WHITE GAUSSIAN NOISE GENERATION (2ch)
2
ELEMENTARY SIGNAL 1
ELEMENTARY SIGNAL 2

FIG.19

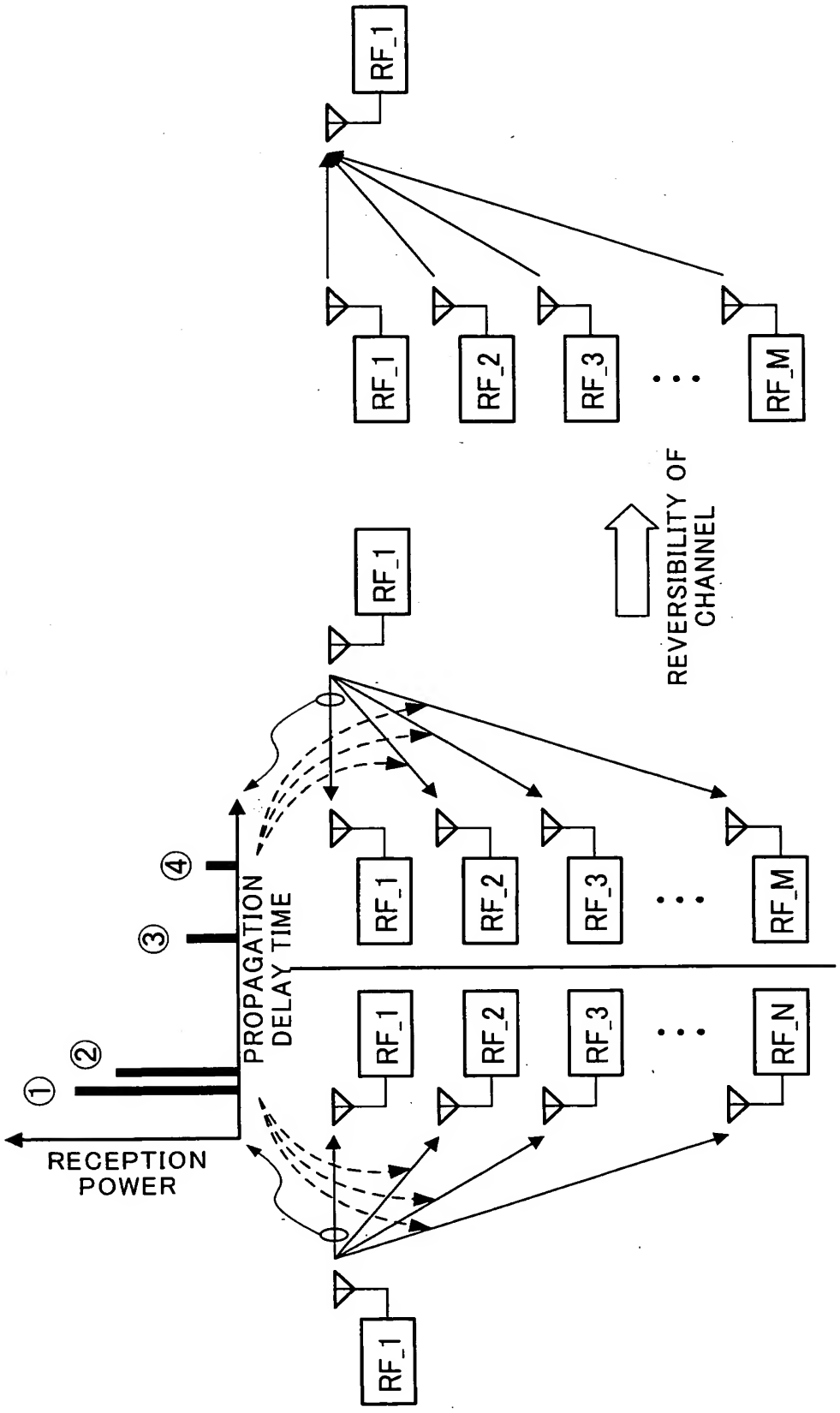


FIG.20(B)

FIG.20(A)

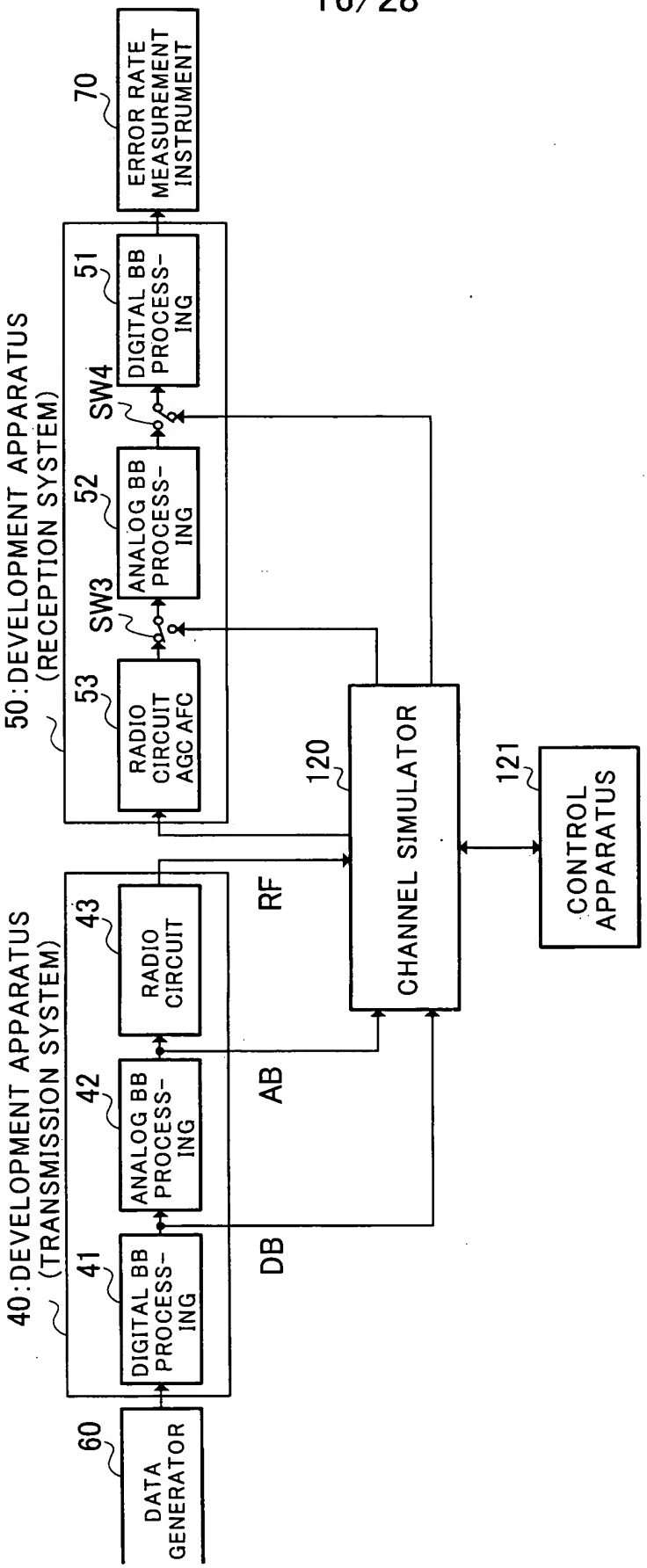

60
DATA GENERATOR
40:DEVELOPMENT APPARATUS (TRANSMISSION SYSTEM)
41
DIGITAL BB PROCESS-ING
42
ANALOG BB PROCESS-ING
43
RADIO CIRCUIT
DB
AB
RF
120
CHANNEL SIMULATOR
121
CONTROL APPARATUS
50:DEVELOPMENT APPARATUS (RECEPTION SYSTEM)
53
RADIO CIRCUIT AGC AFC
SW3
52
ANALOG BB PROCESS-ING
SW4
51
DIGITAL BB PROCESS-ING
70
ERROR RATE MEASUREMENT INSTRUMENT

FIG.21

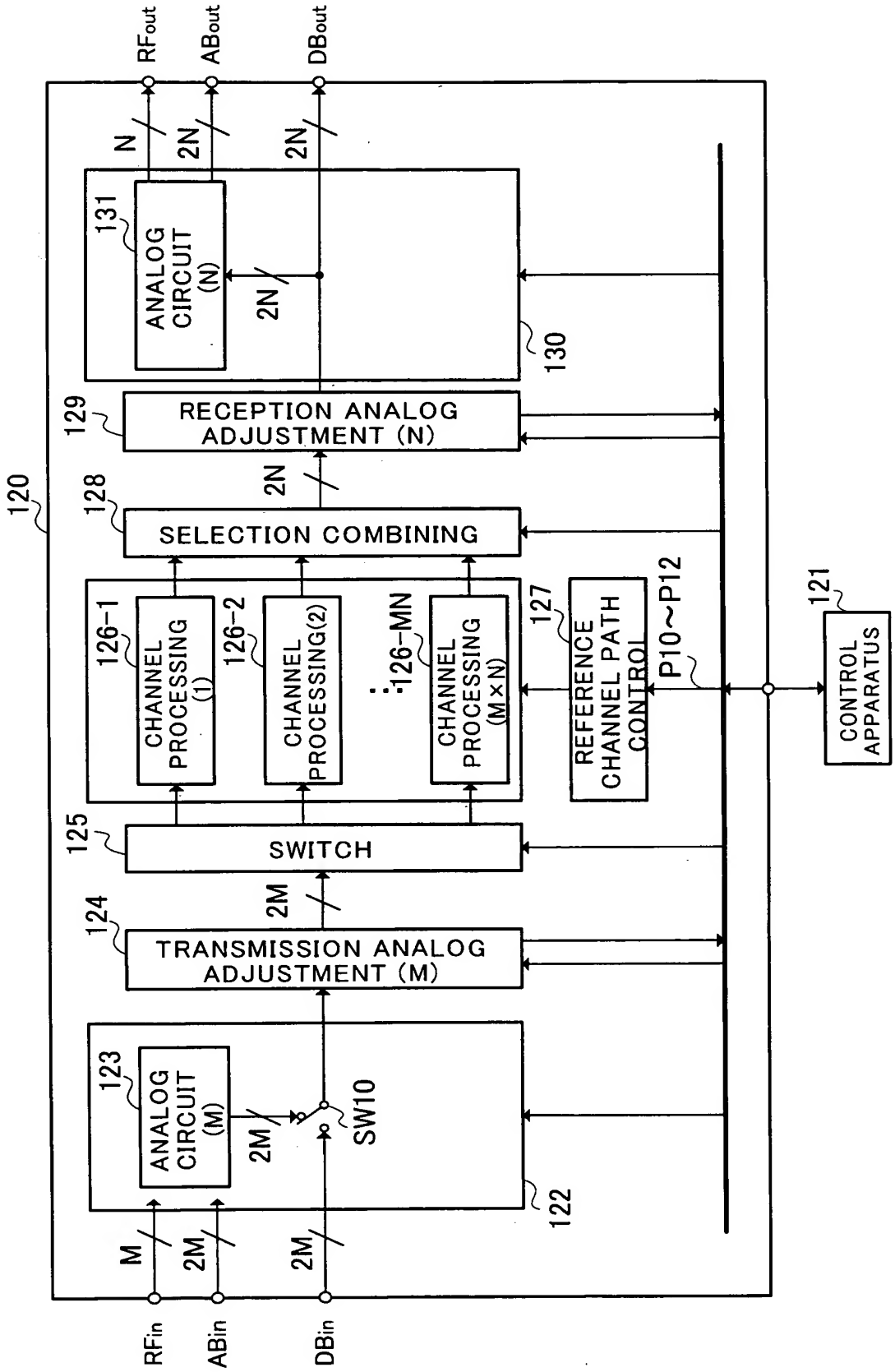

RFout
ABout
DBout
N
2N
2N
131
ANALOG CIRCUIT (N)
2N
130
129
RECEPTION ANALOG ADJUSTMENT (N)
120
2N
128
SELECTION COMBINING
126-1
CHANNEL PROCESSING (1)
126-2
CHANNEL PROCESSING(2)
126-MN
CHANNEL PROCESSING (M×N)
127
REFERENCE CHANNEL PATH CONTROL
P10~P12
121
CONTROL APPARATUS
125
SWITCH
2M
124
TRANSMISSION ANALOG ADJUSTMENT (M)
123
ANALOG CIRCUIT (M)
2M
SW10
122
M
2M
2M
RFin
ABin
DBin

FIG.22

P10	MODEL TYPE TRAVELING SPEED·DIRECTION ARRANGEMENTS·DIRECTIONALITIES OF TRANSMISSION AND RECEPTION ANTENNAS PHASE VARIATION ON/OFF
P11	THE NUMBER OF PATHS DELAY·COMPLEX GAIN OF EACH PATH
P12	RAY-TRACE/ACTUAL RUNNING EXPERIMENT DATA
P13	INSTANTANEOUS VARIATION INITIAL VALUE OF EACH PATH OF THE REFERENCE CHANNEL
P14	CARRIER FREQUENCY TRAVELING SPEED·DIRECTION ARRANGEMENTS·DIRECTIONALITIES OF TRANSMISSION AND RECEPTION ANTENNAS PHASE VARIATION ON/OFF
P15	THE NUMBER OF PATH DIVISIONS (WHEN COMPRESSED) THE NUMBER OF PATHS OF THE REFERENCE CHANNEL DELAY·SHORT-TERM VARIATION COMPLEX GAIN ·ANGLE OF ARRIVAL·LINE-OF-SIGHT ANGLE ON EACH PATH OF THE REFERENCE CHANNEL
P16	THE NUMBER OF PATHS DELAY OF EACH PATH COMPLEX GAIN OF INSTANTANEOUS VARIATION OF EACH PATH
P17	THE NUMBER OF PATHS DELAY OF EACH PATH COMPLEX GAIN OF INSTANTANEOUS VARIATION OF EACH PATH
P18	THE NUMBER OF PATHS COMPLEX GAIN OF SHORT-TERM VARIATION OF EACH PATH
P19	THE NUMBER OF PATHS COMPLEX GAIN OF SHORT-TERM VARIATION OF EACH PATH
P20	THE NUMBER OF PATHS DELAY·ANGLE OF ARRIVAL·LINE-OF-SIGHT ANGLE ON EACH PATH
P30	ON EACH CHANNEL INSTANTANEOUS VARIATION INITIAL VALUE OF EACH PATH UNIT EIGENVECTOR OF EACH PATH

FIG.23

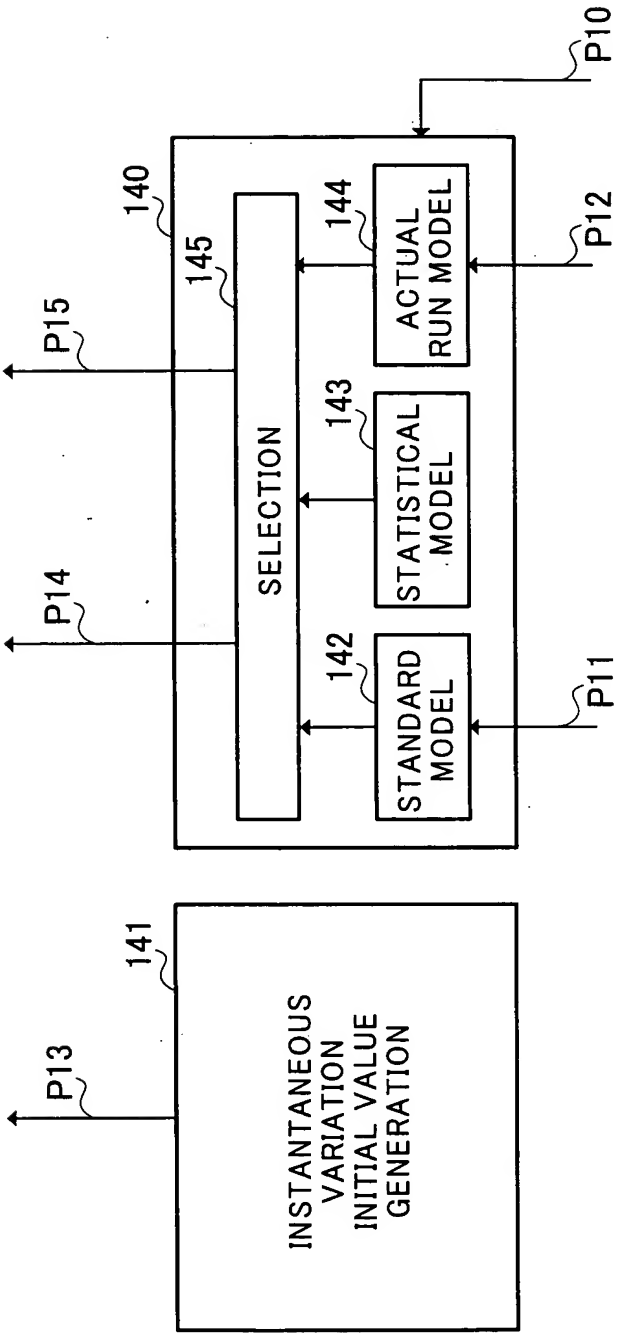

127 REFERENCE CHANNEL PATH CONTROL SECTION
INSTANTANEOUS VARIATION INITIAL VALUE GENERATION
141
P13
140
SELECTION
145
STANDARD MODEL
142
STATISTICAL MODEL
143
ACTUAL RUN MODEL
144
P10
P11
P12
P14
P15

FIG.24

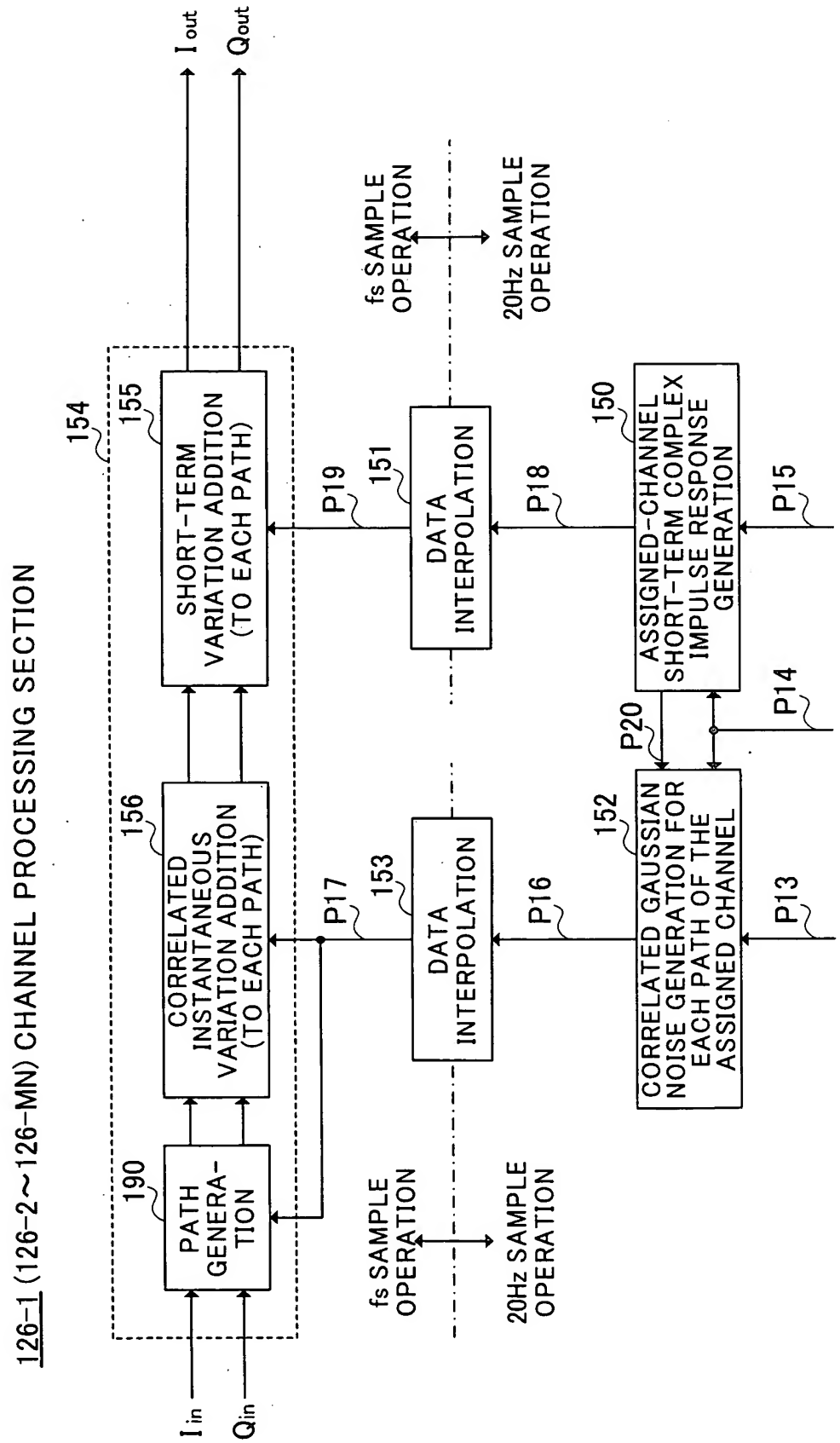

126-1 (126-2～126-MN) CHANNEL PROCESSING SECTION
154
155
156
190
150
151
152
153
P13
P14
P15
P16
P17
P18
P19
P20
I in
Q in
I out
Q out
PATH GENERA-TION
CORRELATED INSTANTANEOUS VARIATION ADDITION (TO EACH PATH)
SHORT-TERM VARIATION ADDITION (TO EACH PATH)
CORRELATED GAUSSIAN NOISE GENERATION FOR EACH PATH OF THE ASSIGNED CHANNEL
DATA INTERPOLATION
DATA INTERPOLATION
ASSIGNED-CHANNEL SHORT-TERM COMPLEX IMPULSE RESPONSE GENERATION
fs SAMPLE OPERATION
20Hz SAMPLE OPERATION
fs SAMPLE OPERATION
20Hz SAMPLE OPERATION

FIG.25

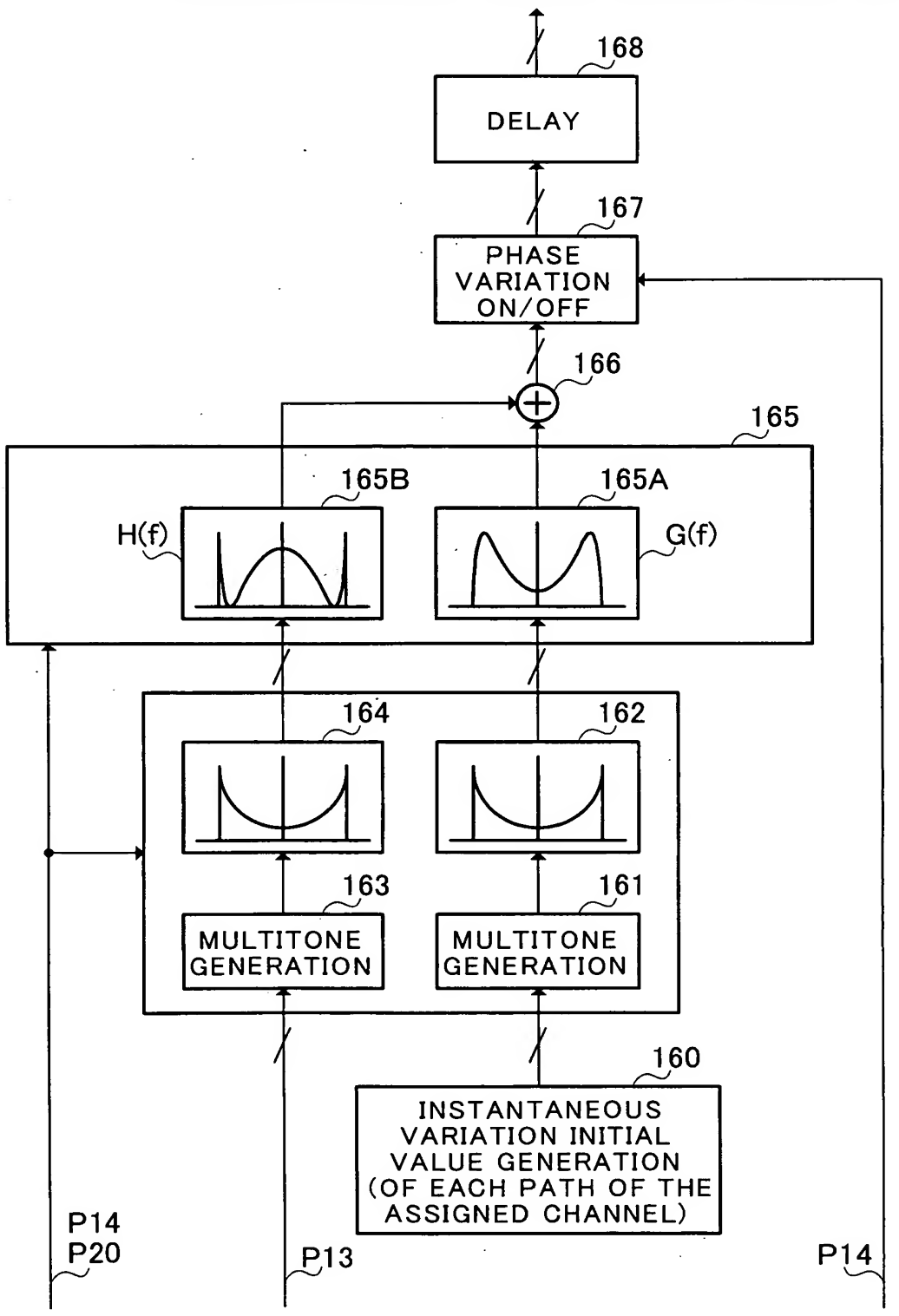

152 CORRELATED GAUSSIAN NOISE GENERATING SECTION
ASSIGNED-CHANNEL INSTANTANEOUS VARIATION
168
DELAY
167
PHASE VARIATION ON/OFF
166
165
165B
165A
H(f)
G(f)
164
162
163
161
MULTITONE GENERATION
MULTITONE GENERATION
160
INSTANTANEOUS VARIATION INITIAL VALUE GENERATION (OF EACH PATH OF THE ASSIGNED CHANNEL)
P14
P20
P13
P14

FIG.26

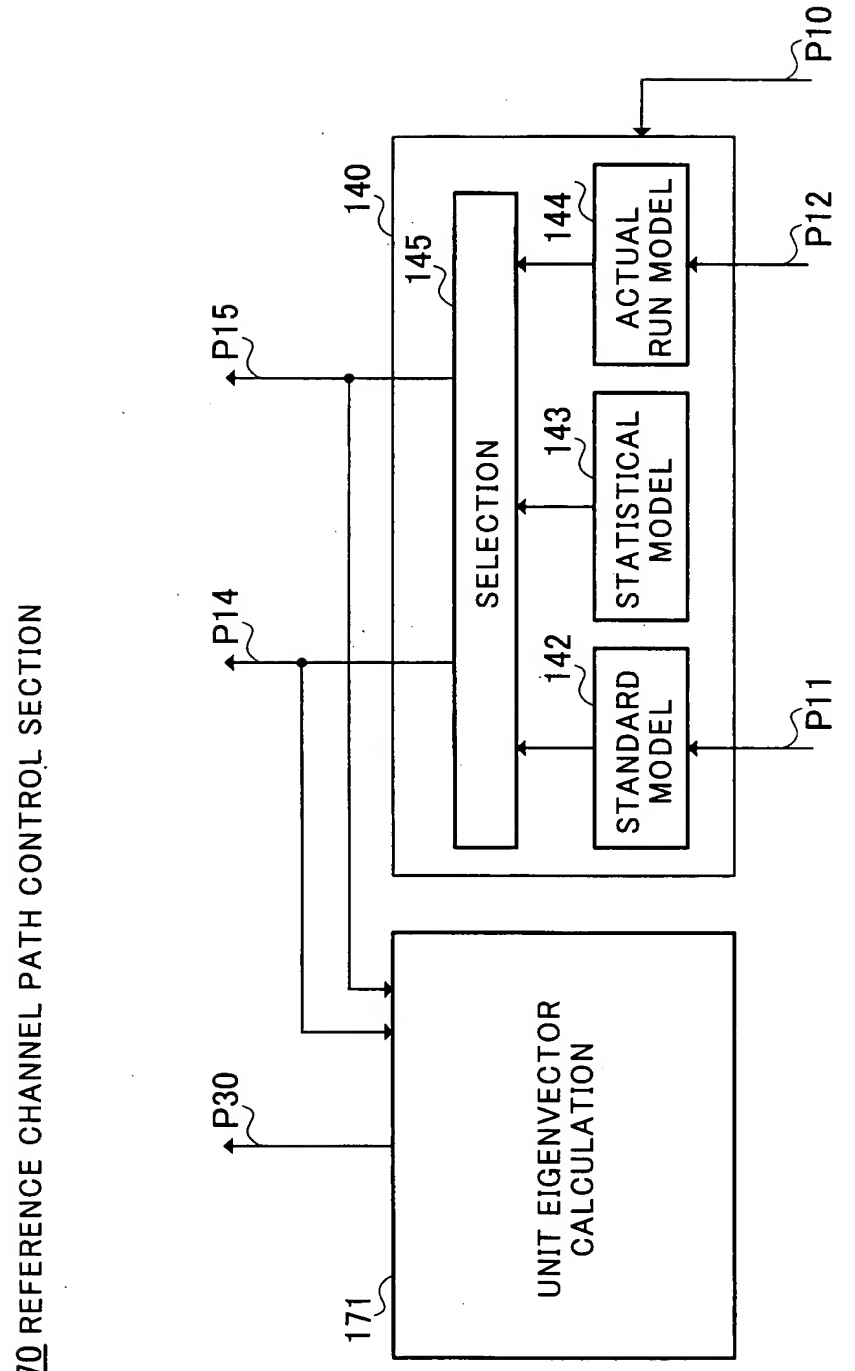

170 REFERENCE CHANNEL PATH CONTROL SECTION
P10
140
145
SELECTION
144
ACTUAL RUN MODEL
P12
P15
143
STATISTICAL MODEL
P14
142
STANDARD MODEL
P11
P30
UNIT EIGENVECTOR CALCULATION
171

FIG.27

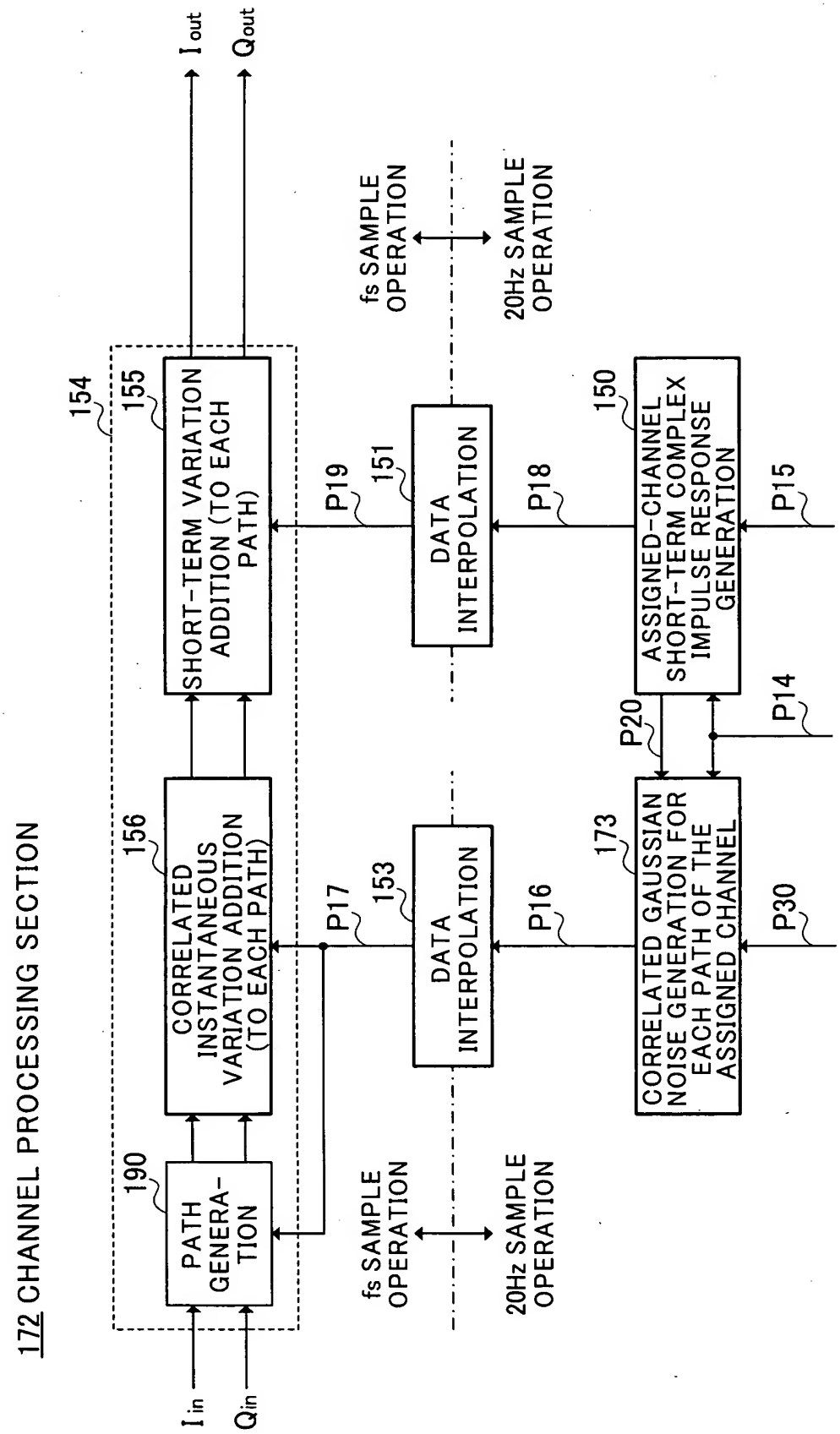

172 CHANNEL PROCESSING SECTION
154
155
SHORT-TERM VARIATION ADDITION (TO EACH PATH)
156
CORRELATED INSTANTANEOUS VARIATION ADDITION (TO EACH PATH)
190
PATH GENERA-TION
I in
Q in
I out
Q out
fs SAMPLE OPERATION
20Hz SAMPLE OPERATION
P19
151
DATA INTERPOLATION
P17
153
DATA INTERPOLATION
P18
150
ASSIGNED-CHANNEL SHORT-TERM COMPLEX IMPULSE RESPONSE GENERATION
P15
P20
P14
173
CORRELATED GAUSSIAN NOISE GENERATION FOR EACH PATH OF THE ASSIGNED CHANNEL
P16
P30

FIG.28

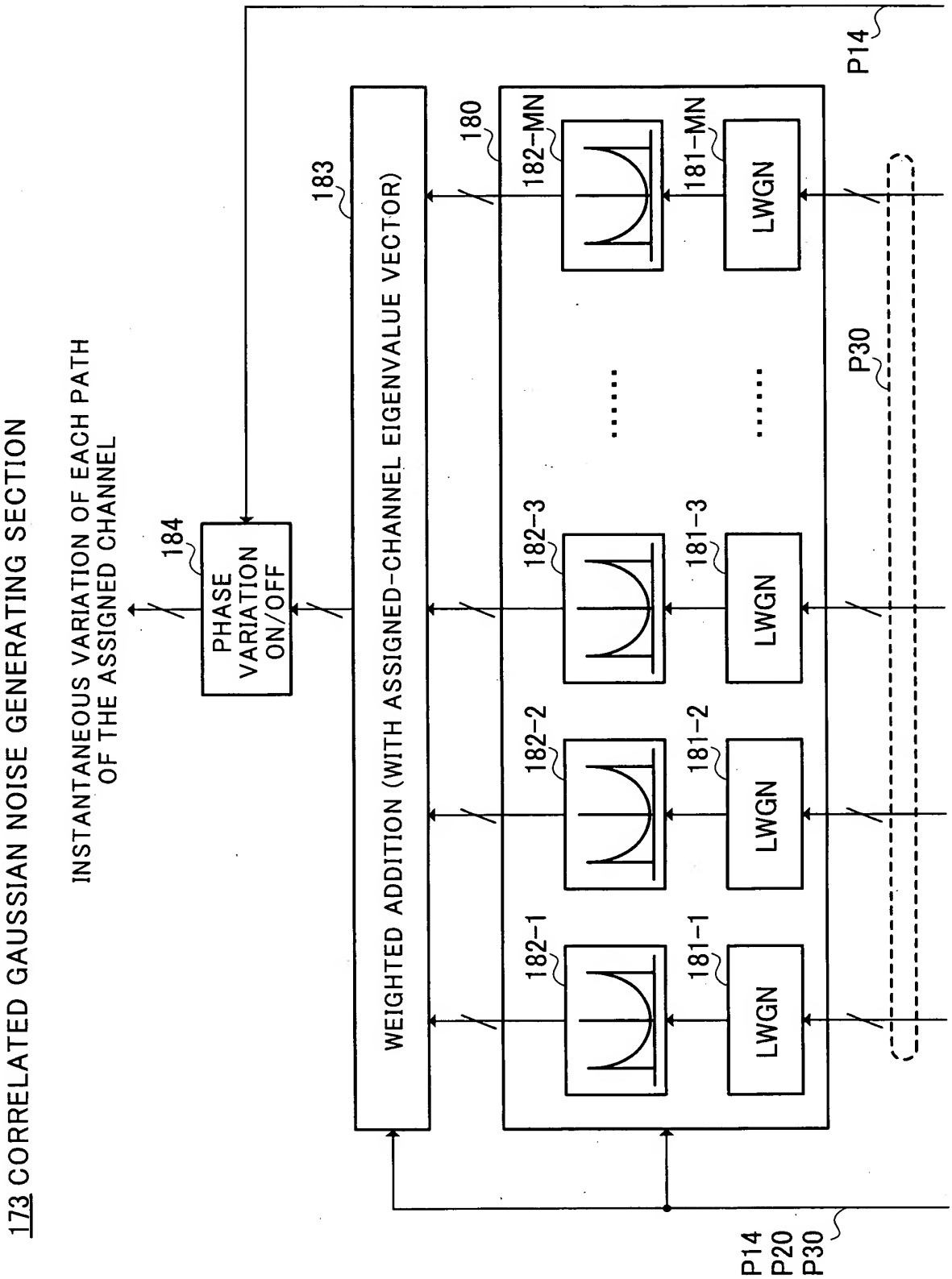

173 CORRELATED GAUSSIAN NOISE GENERATING SECTION
INSTANTANEOUS VARIATION OF EACH PATH OF THE ASSIGNED CHANNEL
184
PHASE VARIATION ON/OFF
183
WEIGHTED ADDITION (WITH ASSIGNED-CHANNEL EIGENVALUE VECTOR)
180
182-1
182-2
182-3
182-MN
181-1
181-2
181-3
181-MN
LWGN
P14
P30
P14 P20 P30

FIG.29

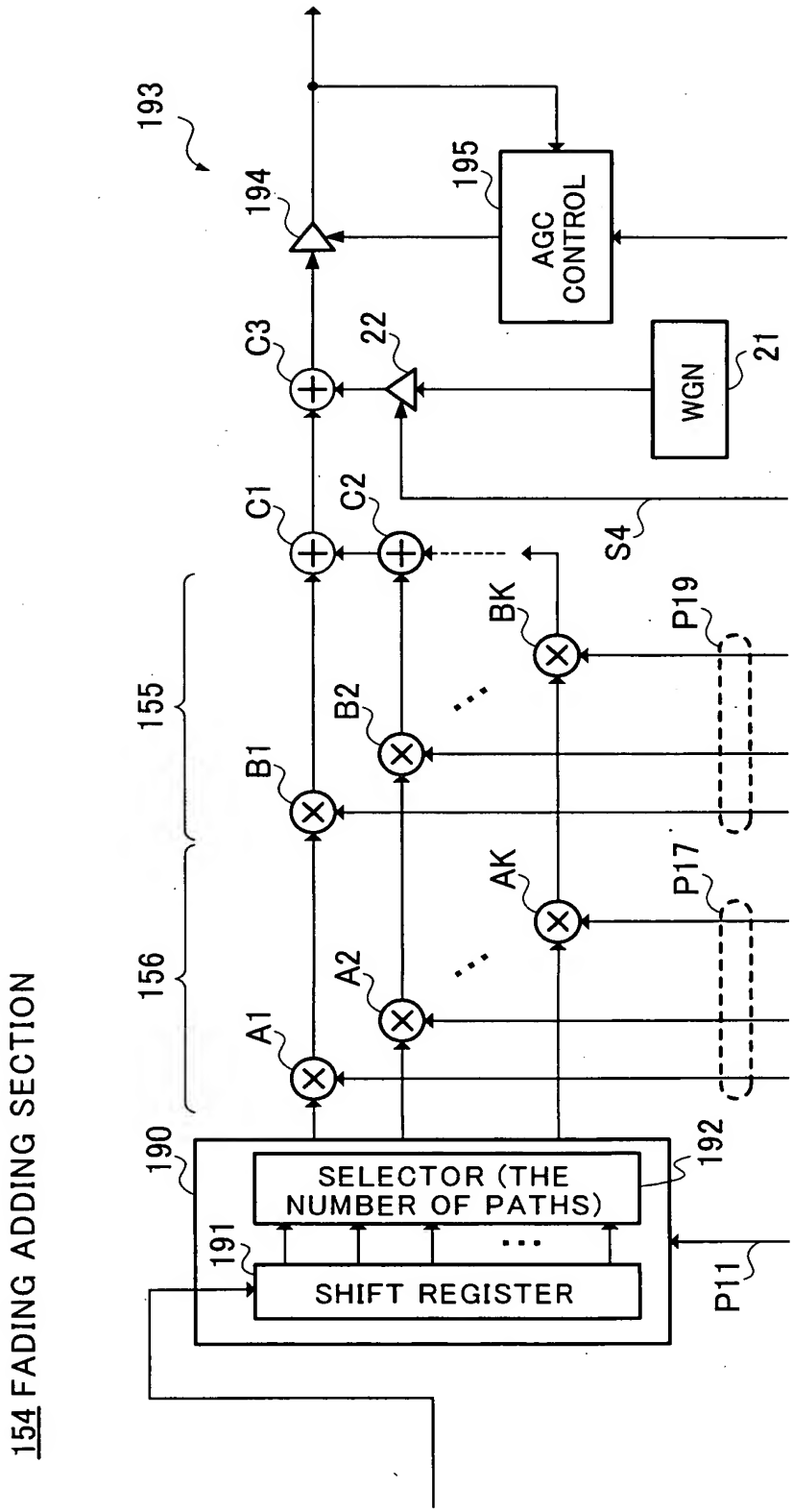

154 FADING ADDING SECTION
193
194
195
AGC CONTROL
C3
22
WGN
21
C1
C2
S4
BK
P19
155
B2
B1
156
AK
P17
A2
A1
190
SELECTOR (THE NUMBER OF PATHS)
192
191
SHIFT REGISTER
P11

FIG.30

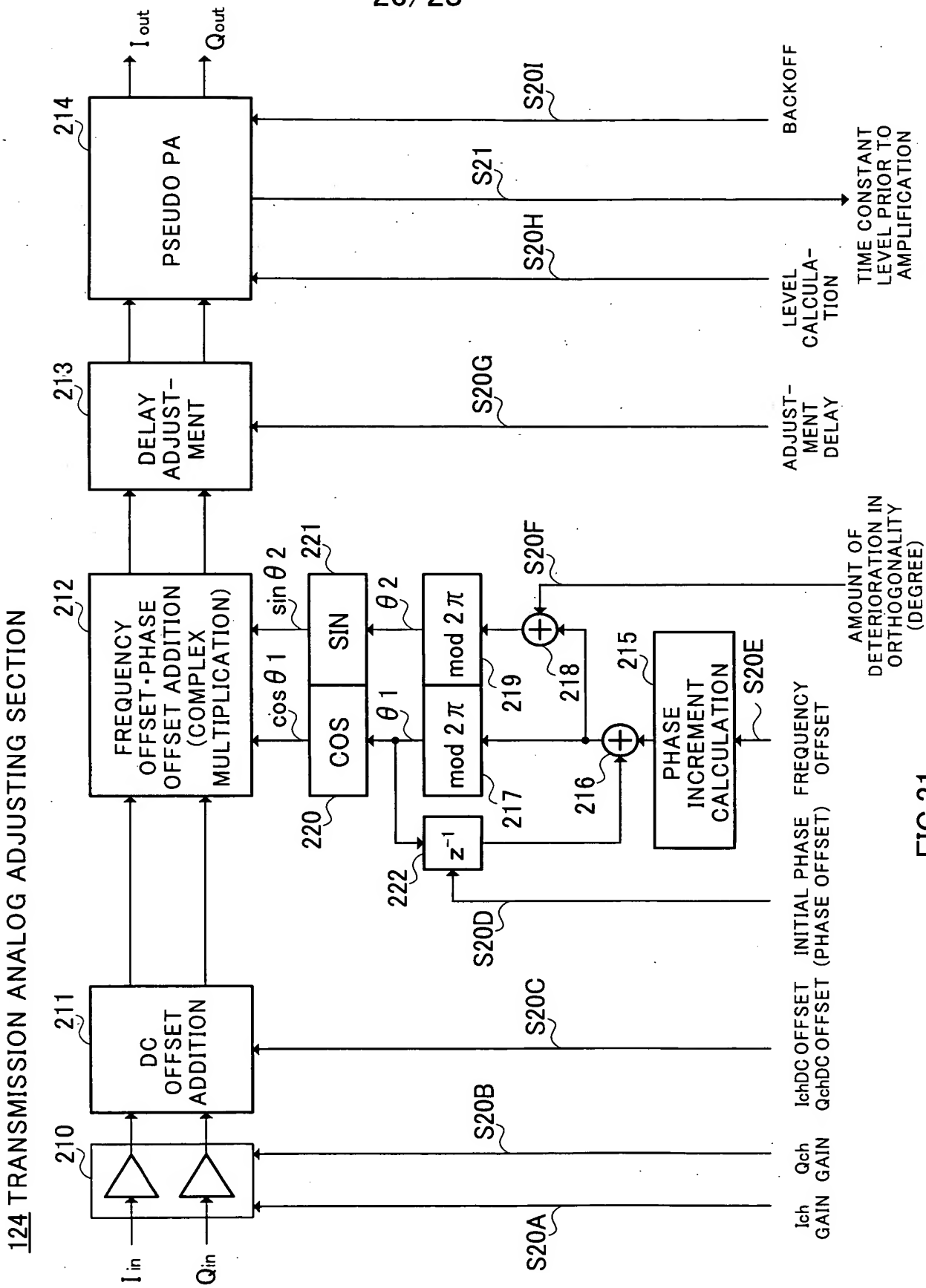

124 TRANSMISSION ANALOG ADJUSTING SECTION
I in
Q in
210
211
DC OFFSET ADDITION
212
FREQUENCY OFFSET·PHASE OFFSET ADDITION (COMPLEX MULTIPLICATION)
213
DELAY ADJUST-MENT
214
PSEUDO PA
I out
Q out
220
COS
SIN
221
cos θ1
sin θ2
θ1
θ2
mod 2π
mod 2π
217
219
222
z⁻¹
215
PHASE INCREMENT CALCULATION
216
218
S20F
S20A
S20B
S20C
S20D
S20E
S20G
S20H
S21
S20I
Ich GAIN
Qch GAIN
IchDC OFFSET
QchDC OFFSET
INITIAL PHASE (PHASE OFFSET)
FREQUENCY OFFSET
AMOUNT OF DETERIORATION IN ORTHOGONALITY (DEGREE)
ADJUST-MENT DELAY
LEVEL CALCULA-TION
TIME CONSTANT LEVEL PRIOR TO AMPLIFICATION
BACKOFF

FIG.31

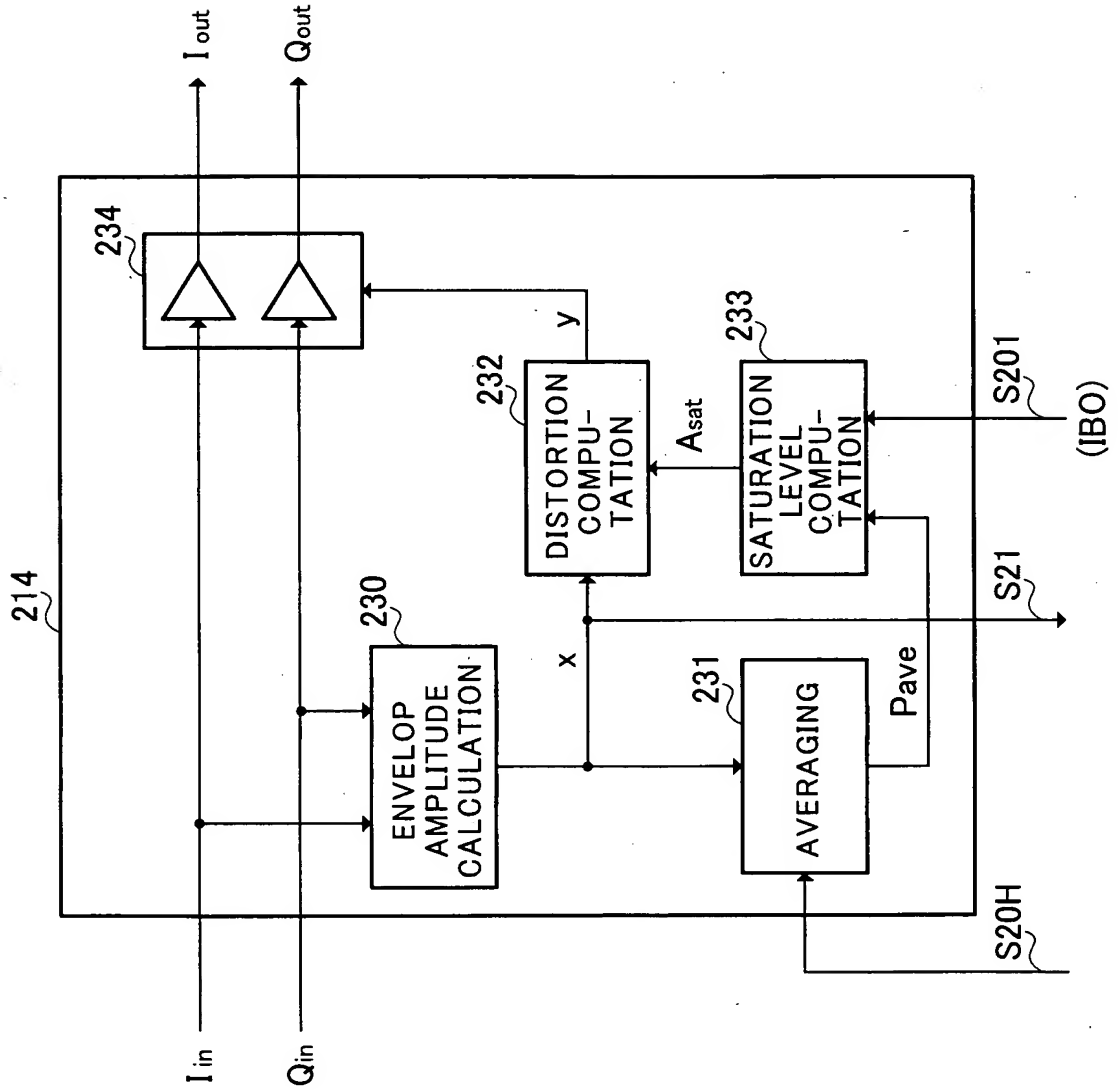

I out
Q out
234
y
232
DISTORTION COMPU-TATION
Asat
233
SATURATION LEVEL COMPU-TATION
S201
(IBO)
214
230
ENVELOP AMPLITUDE CALCULATION
x
231
AVERAGING
Pave
S21
S20H
I in
Q in

FIG.32

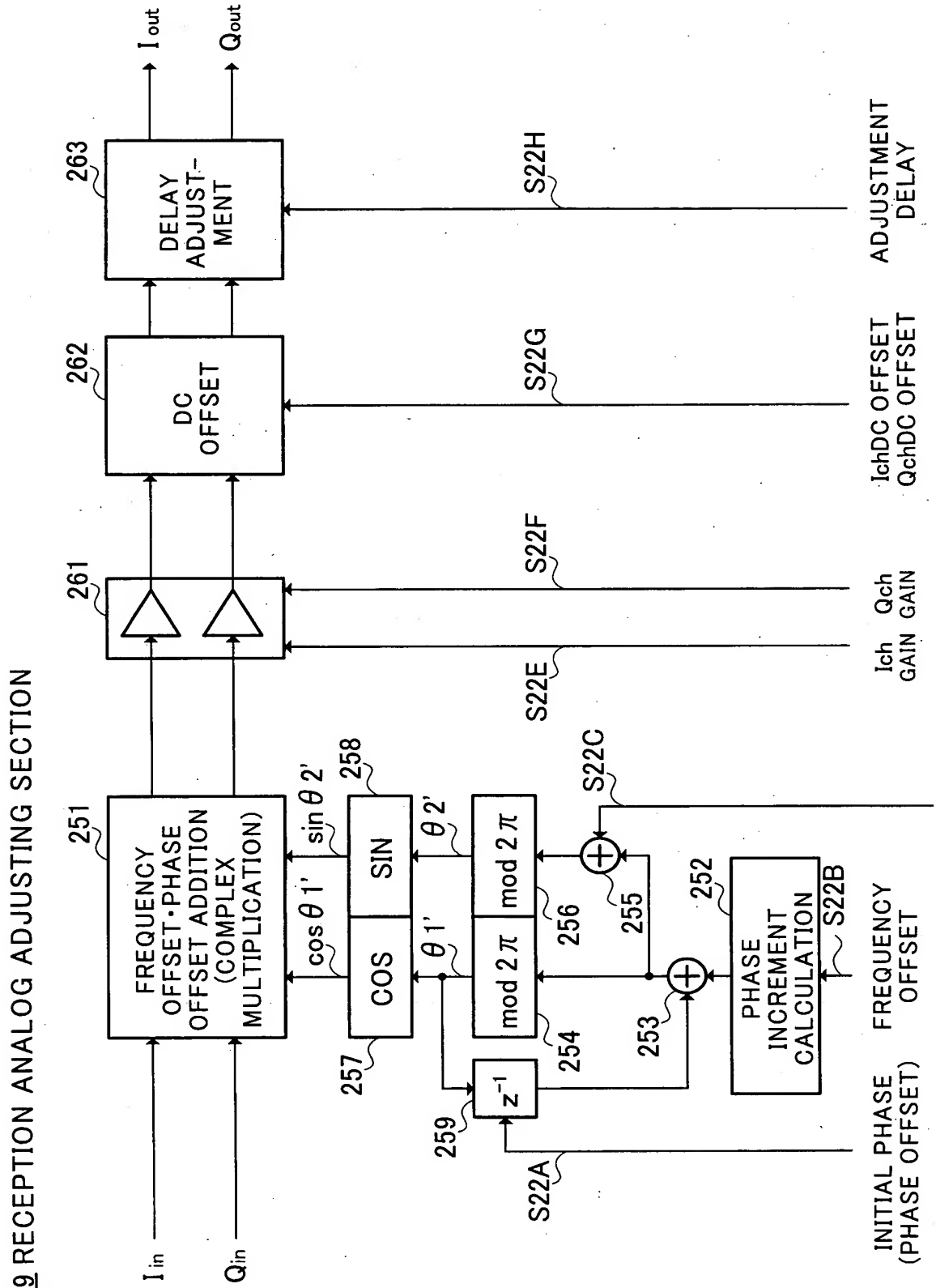

129 RECEPTION ANALOG ADJUSTING SECTION
I in
Q in
I out
Q out
251
FREQUENCY OFFSET·PHASE OFFSET ADDITION (COMPLEX MULTIPLICATION)
261
262
DC OFFSET
263
DELAY ADJUST-MENT
cos θ 1'
sin θ 2'
θ 1'
θ 2'
257
COS
258
SIN
259
z-1
254
mod 2π
256
mod 2π
255
253
252
PHASE INCREMENT CALCULATION
S22A
S22B
S22C
S22E
S22F
S22G
S22H
INITIAL PHASE (PHASE OFFSET)
FREQUENCY OFFSET
AMOUNT OF DETERIORATION IN ORTHOGONALITY (DEGREE)
Ich GAIN
Qch GAIN
IchDC OFFSET
QchDC OFFSET
ADJUSTMENT DELAY

FIG.33